Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381

MAY 0 1 1996

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of) Docket No. 50-390
Tennessee Valley Authority)

WATTS BAR NUCLEAR PLANT (WBN) - UNIT 1 - FACILITY OPERATING LICENSE NPF-90 - LICENSEE EVENT REPORT (LER) 50-390/96013 - EMERGENCY GAS TREATMENT SYSTEM (EGTS) INOPERABILITY

The purpose of this letter is to provide the subject LER. The enclosed report provides details regarding EGTS inoperability on April 2, 1996. Submittal of this report is in accordance with 10 CFR 50.73(a)(2)(ii)(B).

If you should have any questions, please contact P. L. Pace at (423) 365-1824.

Sincerely,

D. V. Kehoe
Nuclear Assurance
and Licensing Manager

Enclosure
cc: See page 2

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cc (Enclosure):
NRC Resident Inspector
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ENCLOSURE

NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
WATTS BAR NUCLEAR PLANT - UNIT 1	05000390	1 OF 6

TITLE (4)

Emergency Gas Treatment System (EGTS) Inoperability

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
04	02	96	96	013	00	05	01	96	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	1
POWER LEVEL (10)	016

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
20.2203(a)(1)	20.2203(a)(3)(i)	X 50.73(a)(2)(ii)	50.73(a)(2)(x)
20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
20.2203(a)(2)(ii)	20.2203(a)(4)	50.73(a)(2)(iv)	OTHER
20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Rickey Stockton, Compliance Licensing Engineer	(423) 365-1818

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
B	BH	PDIC	F180	NO						

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On April 2, 1996, at 1155 EST, with Unit 1 in Mode 1 at approximately 16 percent reactor power and generator load at approximately 85 MWe, a Limiting Condition for Operation (LCO) action statement for Technical Specification (TS) 3.6.9 was entered due to a concern regarding the Emergency Gas Treatment System (EGTS) pressure controller design. The following day, April 3, 1996, TVA determined that under initial loss of coolant accident (LOCA) conditions, the EGTS may not be capable of fulfilling its safety function for a period of time under the worst case single failure conditions. The EGTS is used to keep air pressure in the shield building annulus below atmospheric pressure at all times and to process air through the high efficiency particulate air (HEPA) filters and carbon adsorbers prior to release to the atmosphere during accident conditions.

In the event of a LOCA, the initial pressure response in the annulus may cause the setpoint for swapover from the train in "auto" to the train in "standby" to be exceeded. If the standby train were to suffer a single failure, automatic control of the annulus vacuum would be lost for a period of time until the setpoint for re-enabling the initial (auto) train is reached. An informal analysis indicated that there would not be an impact on control room or offsite doses with existing containment leakage figures.

Corrective action included the implementation of Design Change Notice M-38766-A which revised the controller setpoint so that the single failure hazard was eliminated. LCO for TS 3.6.9 was exited on April 8, 1996.

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
WATTS BAR NUCLEAR PLANT - UNIT 1	05000390	96	-- 013 --	00	2 OF 6

TEXT *(If more space is required, use additional copies of NRC Form 366A)* **(16)**

I. PLANT CONDITIONS

At the time of the entry into LCO for TS 3.6.9, Unit 1 was in Mode 1 at approximately 16 percent reactor (Energy Industry Identification System (EIIS) Code BH) power and generator (EIIS Code TG) load at approximately 85 MWe.

II. DESCRIPTION OF EVENT

A. Event

On April 2, 1996 at 1155 EST, with Unit 1 in Mode 1 at approximately 16 percent reactor power and generator load at approximately 85 MWe, a Limiting Condition for Operation (LCO) action statement for Technical Specification (TS) 3.6.9 was entered due to the Emergency Gas Treatment System (EGTS) pressure controller (EIIS Code MDR) design which was determined to cause the train in "Auto" to be inoperable if a LOCA condition occurred concurrent with a pressure spike. The pressure spike would cause the controller to transfer to "standby" and leave the "auto" train inoperable. The following day, April 3, 1996, TVA determined, based upon engineering review, that under initial loss of coolant accident (LOCA) conditions, the EGTS may not be capable of fulfilling its safety function for a period of time under the worst case single failure conditions. This EGTS is used to keep air pressure in the shield building annulus below atmospheric pressure at all times and to process air through the HEPA and charcoal filters (EIIS Code FLT) prior to release to the atmosphere during accident conditions.

In the event of a LOCA, the initial pressure response in the annulus may cause the setpoint for swapover from the train in "Auto" to the train in "Standby" to be exceeded. If the standby train were to suffer a single failure, automatic control of the annulus vacuum would be lost for a period of time until the setpoint for re-enabling the initial (Auto) train is reached. Informal analysis indicated that there would not be an impact on control room or offsite doses with existing containment leakage figures.

On April 5, 1996, TVA issued Design Change Notice M-38766-A which revised the controller setpoint so that the single failure hazard was eliminated. This DCN was implemented and closed on April 7, 1996. The LCO for TS 3.6.9 was exited at 1025 EST on April 8, 1996.

B. Inoperable Structures, Components, or Systems that Contributed to the Event

There were no inoperable structures, components or Systems other than EGTS that contributed to the event.

C. Dates and Approximate Times of Major Occurrences

DATE	TIME	EVENT
April 2, 1996	1155	Unit 1 entered 7 day LCO action statement to restore 1 train to operable status for TS 3.6.9.

DATE	TIME	EVENT
April 5, 1996		Issued DCN M-38766-A.
April 7, 1996		Implemented and closed DCN M-38766-A.
April 8, 1996	1025	Exited LCO for TS 3.6.9.

D. Other Systems or Secondary Functions Affected

There were no other systems or secondary functions affected.

E. Method of Discovery

While reviewing a design calculation during the cause investigation for Problem Evaluation Report WBPER960189, the system engineer identified this condition.

F. Operator Actions

Upon review of WBPER960233 for operability, the operators entered LCO for TS 3.6.9. They subsequently reported this condition under 10 CFR 50.72 when WBN engineering determined that under initial LOCA conditions, the EGTS may not be capable of fulfilling its safety function for a period of time under the worst case single failure conditions.

G. Automatic and Manual Safety System Response

There were no automatic or manual safety system responses.

III. CAUSE OF EVENT

A. Immediate Cause

The immediate cause was that the EGTS controller's setpoint was incorrect.

B. Root Cause

The cause for the incorrect EGTS controller's setpoint was determined to be a combination of failure of a design calculation to account for a LOCA pressure profile and two design calculations being performed out of the required sequence. Design Calculation 1-PDT-65-80, Revision 4 provided the control setpoint of -1.048 inches water as an input to calculation TI-ANL-166, Revision 8. That setpoint was determined based on upper and lower safety limits as well as instrument inaccuracies. Calculation TI-ANL-166 was then performed which determined the time dependent pressure profile in the annulus and EGTS exhaust rates based on that setpoint. Neither the setpoint calculation nor the safety limit calculation took into account any pressure profile as a result of a LOCA.

The correct calculation methodology is for calculation TI-ANL-166 to establish the setpoint and a pressure profile with calculation 1-PDT-65-80 as a successor calculation. This inverted successor/predecessor sequence resulted in the actual annulus LOCA pressure profile not being available. With the corrected sequence, the annulus pressure profile from TI-ANL-166 is available for input into 1-PDT-65-80 which would have prevented the described condition.

IV. ANALYSIS OF EVENT - ASSESSMENT OF SAFETY CONSEQUENCES

A. Evaluation of Plant Systems/Components

The WBN EGTS is a safety grade system designed to maintain negative annulus pressure following an accident and to process effluent from the annulus prior to discharge to the atmosphere. The EGTS contains two separate control systems to provide redundant control of annulus pressure following a design basis accident. These control systems serve to modulate EGTS return flow to the annulus and to the discharge vent to control annulus pressure at the control setpoint. In addition to the modulating control systems, the design incorporates redundant isolation damper (EIIS Code DMP) controls which select the preferred modulating control by opening the preferred flow path and isolating the non-preferred path. Each of these isolation control circuits contain two "arming" logic circuits.

The normal configuration is for one of the EGTS isolation controls systems to be in automatic while the other is in standby. At the initiation of an accident, the automatic isolation circuit opens the preferred flow path and allows the modulating controls in that path to control the flow. The "arming" logic continues to monitor the annulus pressure for abnormalities. If an abnormal condition is detected, the arming circuits isolate the automatic path and open the standby path to allow the modulating controls in that path to control EGTS flow. Both trains of EGTS fans (EIIS Code FAN) start on the accident signal.

Shield building vent and containment annulus isolation valves (EIIS Code PCV), 1-PCV-65-81/86 and 1-PCV-65-83/87, are designed such that one train is in A-auto and the other set is in A-auto standby. Upon initiation of a design basis accident, the train in A-auto opens to place the respective pressure controlling loop in service and the A-auto standby train remains closed to provide redundant backup in the event of a single failure of the operating loop. With an abnormal negative pressure in the annulus, indicative of the failure of the operating pressure control loop, the set of pressure control valves in A-auto close and the A-auto standby set open to place the redundant pressure controlling loop in service. Once the swap has occurred the PCVs remain in position and will not swap back. One signal which initiates the swap of controllers is a decrease of annulus differential pressure (loss of vacuum). The setpoint for these switches is annulus differential pressure decreasing less negative than -0.812 inches water column. The limiting design basis accident for EGTS is during a LOCA and calculation TI-ANL-166 models the annulus pressure for this design basis accident.

According to the calculation preparer, the relative annulus location for these values is the same as was used in the demonstrated accuracy calculation for the pressure differential switches (EIIS Code PDIS). TI-ANL-166 indicates the annulus pressure peaks at -0.6423 inches water column which is less negative than the setpoint of these switches. This would actuate the swap-over of pressure controllers and potentially render the isolated train inoperable even though the single failure criteria had not been met. The annunciation associated with the swap-over would tend to make the operators believe the actions had occurred due to the design single failure and actions may not be taken to realign the PCVs for standby operation. This condition would leave the EGTS susceptible to a single failure.

B. Evaluation of Personnel Performance

Upon notification of this EGTS condition, operation personnel appropriately entered the action A.1 of LCO 3.6.9 for the restoration of the EGTS train to operable status.

C. Safety Significance

An informal engineering analysis was performed to determine the impact of delayed EGTS startup. The results of this analysis revealed that doses were less than the 10CFR100 and 10CFR50 Appendix A GDC 19 limits except for the RG 1.4 case inhalation doses which use maximum design basis containment leakage. When using RG 1.4 dose values with maximum design basis containment leakage, the control room inhalation dose exceeded the 30 rem limit and the 2 hour Exclusionary Area Boundary (EAB) dose exceeded the 300 rem limit (thyroid limit). However, when the actual WBN condition values are used (results of the most recent Integrated Leak Rate Test (ILRT), the 10CFR100 and GDC limits would not have been exceeded had a LOCA occurred with the condition uncorrected.

V. CORRECTIVE ACTIONS

A. Immediate Corrective Actions

TVA has issued and implemented Design Change Notice M-38766-A to revise the controller setpoint so that the single failure hazard is eliminated.

B. Corrective Actions to Prevent Recurrence

TVA has determined the extent of condition for this condition is limited to the specific case involving the incorrect annulus setpoint. Although this condition was limited to this specific case, TVA also determined that Nuclear Engineering Procedures provide sufficient control in the generation of calculations. Additionally, personnel responsible for the incorrect predecessor/successor calculation relationship developed the cause analysis, extent of condition, and recurrence controls for this condition. Therefore, no further action is considered necessary.

VI. ADDITIONAL INFORMATION

A. Failed Components

1. Safety Train Inoperability

One train of EGTS equipment was considered inoperable due to this condition.

2. Component/System Failure Information

a. Method of Discovery of Each Component or System Failure:

This condition was identified during an investigation associated with Problem Evaluation Report WBPER960189 (Licensee Event Report 390/96010).

b. Failure Mode, Mechanism, and Effect of Each Failed Component:

The failure mechanism is that the controller setpoints were incorrectly specified by design documents.

c. Root Cause of Failure:

Design - The incorrectly specified EGTS controller setpoint as previously discussed was identified as the root cause of this condition.

d. For Failed Components With Multiple Functions, List of Systems or Secondary Functions Affected:

No other functions were affected.

e. Manufacturer and Model Number of Each Failed Component:

The Foxboro Company, Controller Model No. N-250HM-M2NH-F

B. Previous Similar Events

For Watts Bar Nuclear Plant, no similar events have been previously reported under 10CFR50.72 or 10CFR50.73. However, this condition was identified during the cause investigation for LER 390/96010.

VII. COMMITMENTS

The actions taken in response to this event are tabulated in Section V, Corrective Actions. These actions are complete.